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Mr. Steven M. Rabin  
c/o RABIN & BERDO, P.C.  
Suite 500  
1101 14th Street, NW  
Washington, DC 20005

EXAMINER

LOKE, STEVEN HO YIN

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/070,536

Applicant(s)

SAKAMOTO, KAZUHISA

Examiner

Steven Loke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-10 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification never discloses a universal contact structure is provided in the contact region with the second conductivity type region in contact with the boundary portion of the contact region as claimed in claim 3. The specification never discloses a bonding region is defined on the first conductivity type semiconductor region for bonding a wire to the electrode, and the diode is provided at least in a part of the boundary portion of the contact region adjacent to the bonding region as claimed in claim 9.
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
5. Claims 1-3, 5, 7, 8 and 10 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Nagura (Japanese patent no. 62-58678 (IDS filed on 3/7/02)).

In regards to claim 1, Nagura shows all the elements of the claimed invention in fig. 1(d). It is a semiconductor device, comprising: a functional element having a first conductivity type (p-type) semiconductor region [4] provided in a semiconductor substrate [1], and a second conductivity type (n-type) semiconductor region [5] provided in contact with the first conductivity type semiconductor region [4] and having a conductivity type different from that of the first conductivity type semiconductor region [4], wherein a diode (a semiconductor structure formed by regions [6, 4]) is provided in a boundary portion of a contact region to which an electrode [7] is connected in the first conductivity type semiconductor region [4].

In regards to claim 2, Nagura further discloses the diode is a PN diode constituted by the first conductivity type semiconductor region [4] and a second conductivity type region [6] embedded in the first conductivity type semiconductor region [4] in contact with a boundary of the contact region and having a conductivity type different from that of the first conductivity type semiconductor region [4].

In regards to claim 3, Nagura further discloses a universal contact structure (a portion of region [4] formed between regions [6]) is provided in the contact region with the second conductivity type region [6] in contact with the boundary portion of the contact region.

In regards to claim 5, Nagura further discloses the diode is provided adjacent a surface of the first conductivity type semiconductor region [4].

In regards to claim 7, Nagura further discloses the diode is provided at least in a part of the boundary portion of the contact region facing the second conductivity type semiconductor region [5].

In regards to claim 8, Nagura further discloses the diode is provided in the entire boundary portion of the contact region.

In regards to claim 10, Nagura further discloses the functional element is a bipolar transistor which comprises a base region [4] defined by the first conductivity type semiconductor region, and an emitter region [5] defined by the second conductivity type semiconductor region.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagura (Japanese patent no. 62-58678).

In regards to claim 9, Nagura differs from the claimed invention by not showing a bonding region is defined on the first conductivity type semiconductor region for bonding a wire to the electrode, and the diode is provided at least in a part of the boundary portion of the contact region adjacent to the bonding region.

It would have been obvious to have the bonding region is defined on the first conductivity type semiconductor region for bonding a wire to the electrode, and the diode is provided at least in a part of the boundary portion of the contact region adjacent

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to the bonding region because the bonding region would provide external connection between the semiconductor device and the external circuit.

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 4, 5, 7 and 10 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Mizushima (IDS filed on 3/7/02).

In regards to claim 1, Mizushima shows all the elements of the claimed invention in fig. 3. It is a semiconductor device, comprising: a functional element having a first conductivity type (p-type) semiconductor region [2] provided in a semiconductor substrate [2], and a second conductivity type (n-type) semiconductor region [3] provided in contact with the first conductivity type semiconductor region [2] and having a conductivity type different from that of the first conductivity type semiconductor region [2], wherein a diode (a semiconductor structure formed by the electrode [9] and the p-type region [2]) is provided in a boundary portion of a contact region to which an electrode [9] is connected in the first conductivity type semiconductor region [2].

In regards to claim 4, Mizushima further discloses a high-concentration impurity region [4'] having the same conductivity type as the first conductivity type semiconductor region [2] and a higher impurity concentration than the first conductivity type semiconductor region is provided in contact with the electrode [9] in the contact region. Since the electrode [9] is in contact with the lightly doped p-type region [2], it is

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inherent that the diode is a Schottky diode because a rectifying behavior would arise between the lightly doped p-type region [2] and the electrode [9].

In regards to claim 5, Mizushima further discloses the diode is provided adjacent a surface of the first conductivity type semiconductor region [2].

In regards to claim 7, Mizushima further discloses the diode is provided at least in a part of the boundary portion of the contact region facing the second conductivity type semiconductor region [3].

In regards to claim 10, Mizushima further discloses the functional element is a bipolar transistor which comprises a base region [2] defined by the first conductivity type semiconductor region, and an emitter region [3] defined by the second conductivity type semiconductor region.

10. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizushima.

In regards to claim 8, Mizushima differs from the claimed invention by not showing the diode is provided in the entire boundary portion of the contact region. It would have been obvious to have the diode is provided in the entire boundary portion of the contact region because it depends to the speed of the device.

In regards to claim 9, Mizushima differs from the claimed invention by not showing a bonding region is defined on the first conductivity type semiconductor region for bonding a wire to the electrode, and the diode is provided at least in a part of the boundary portion of the contact region adjacent to the bonding region.

It would have been obvious to have the bonding region is defined on the first conductivity type semiconductor region for bonding a wire to the electrode, and the diode is provided at least in a part of the boundary portion of the contact region adjacent to the bonding region because the bonding region would provide external connection between the semiconductor device and the external circuit.

11. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The major difference in the claims not found in the prior art of record is the contact region has a generally C-shape or a ring shape which surrounds the second conductivity type semiconductor region on the surface of the first conductivity type semiconductor region.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920. The examiner can normally be reached on 7:50 am to 5:20 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.



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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

sl  
June 29, 2003

Steven Loke  
Primary Examiner

A handwritten signature in black ink that reads "Steven Loke". The signature is written in a cursive style with a large, stylized "S" and "L".